



Case Report

Chest wall reconstruction in recurrent breast carcinoma – a case report

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ABSTRACT

Introduction: Complex chest wall reconstruction after an oncological resection requires a multidisciplinary approach with the aim of curative resection.

Aim: The complexity of such reconstruction is challenged by prior reconstructions that limit the options for free tissue transfer and recipient vessels for microsurgical anastomoses.

Case study: We present a case of an immunocompromised patient with prior breast reconstruction for left breast carcinoma with a pedicled latissimus dorsi flap who presents with a recurrence to the latissimus dorsi flap requiring a more extensive oncological resection.

Results and discussion: This resulted in a large chest wall defect that is reconstructed with plating and an anterolateral thigh fasciocutaneous free flap for soft tissue coverage.

Conclusions: The radical resection allows for excellent overall survival and better quality of life.

1. INTRODUCTION

Breast cancer is the most diagnosed cancer type worldwide with a predicted increase of 40% in new cases per year by 2040. Disease recurrence manifests in nearly 30% of patients with breast cancer who have achieved disease-free status following initial local and regional treatments.^{1,2} Patients with recurrent breast cancer may present with more complicated chest wall defects as the resection would involve a more radical approach. The challenges that the plastic surgeon faces in chest wall reconstruction include cases that had prior reconstruction with a pedicled flap or tumour recurrence that involves potential recipient vessels. Cases such as these are not encountered often especially in patients who are immunocompromised. The ability to reconstruct such complex wounds allow for increased overall survival in patients with recurrence.

2. AIM

We report a case of recurrent breast carcinoma in a woman with human immunodeficiency virus (HIV) infection who underwent a radical resection requiring a chest wall reconstruction.

3. CASE STUDY

We present a case of a 46 year old lady with underlying retroviral disease (RVD) on HAART therapy who had prior locally advanced left breast cancer in 2020. She had neoadjuvant chemotherapy and subsequently underwent a left skin sparing mastectomy with axillary clearance and breast reconstruction with a pedicled latissimus dorsi flap. The histopathology reported a tumour in situ with clear margins and no positive axillary lymph node. She then completed 15# of radiotherapy and was on tamoxifen. She subsequently underwent chemotherapy and was on a monoclonal antibody Herceptin therapy. Two years after her mastectomy, she presented with a hard mass over the latissimus dorsi flap that was increasing in size with pain and adherent to the underlying chest wall. An ultrasound guided biopsy of the mass proved it to be an invasive cancer. CT TAP was arranged and reported a left breast mass with involvement of the chest wall muscle and skin measuring $2.3 \times 4.5 \times 4.0$ cm. She had no distant metastasis detected.

4. RESULTS

After a multidisciplinary team meeting, she was scheduled for a wide local excision of the tumour including resection of the left 4th, 5th and 6th ribs. The resultant defect measured 23×13 cm exposing the left lung. Chest wall reconstruction was done using two titanium plates applied to the 5th and 6th ribs. A polypropylene mesh was then anchored on top of the



Figure 1. Locoregional recurrence over left breast latissimus dorsi flap with preoperative margins for oncological resection.



Figure 2. Skin paddle of the anterolateral thigh flap harvested showing its pedicle comprising of the lateral circumflex femoral vessels.



Figure 3. Chest wall defect post oncological resection exposing the left lung and thoracic cavity.

plates. The inframammary perforators were initially explored to be used as a recipient vessel but was not found. Further exploration was done over the axillary region to identify



Figure 4. Anterolateral thigh flap anastomosed to thoracodorsal vessels to cover titanium plates and polypropylene mesh.

potential recipient vessel before the thoracodorsal vascular bundle was identified. Soft tissue coverage of the defect was completed with an anterolateral thigh (ALT) fasciocutaneous free flap from the left thigh. Three perforators were identified supplying the large flap harvested. The ascending branch of the lateral circumflex femoral artery measuring 3 mm was anastomosed to the thoracodorsal artery with a diameter of 5 mm. Two venae comitantes was anastomosed to the recipient venae comitantes as well. She was discharged well 9 days after the surgery and was able to begin chemotherapy 2 months after surgical excision. She has currently completed chemotherapy and is recurrence free 1 year post-operative.

5. DISCUSSION

Tumour extirpation for recurrent breast cancer has demonstrated favourable outcomes in terms of survival and quality of life.³ However, it would require a chest wall resection leaving either a partial or full thickness defect which warrants immediate reconstruction. The resection may involve the underlying muscle, skeletal support or even breaching the pleural cavity. This requires a multidisciplinary team approach between the breast surgeon, thoracic surgeon as well as the plastic surgeon with expertise in microsurgery.

Chest wall reconstruction aims to restore the skeletal rigidity of the thoracic cavity while protecting the underlying vital structures of the cardiopulmonary system. It also addresses the issue of possible lung herniation and obliteration of dead space. The reconstruction also must consider the resultant cosmesis to empower patients and regain their confidence.

Once a curative intent oncological resection has been done, the ribs are then reconstructed using a titanium plate to provide rigid support to the thorax. It is then covered by a non-rigid prosthesis which is a polypropylene mesh that serves as a base for the soft tissue coverage. The polypropylene mesh also prevents entrapment of the pedicle between the titanium plates as well as lung herniation.

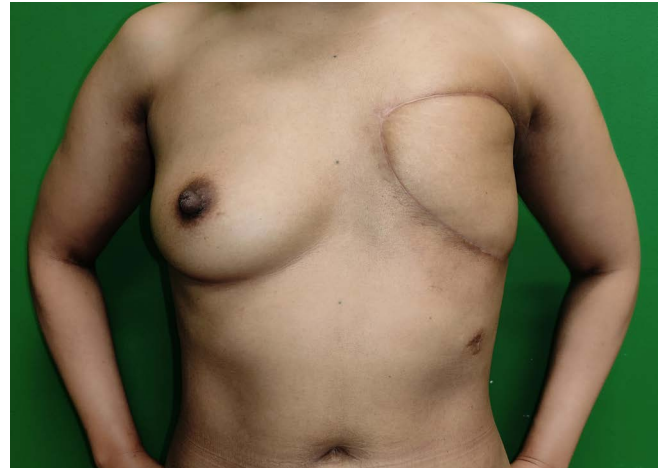


Figure 5. Chest wall reconstruction with anterolateral thigh flap 1 year post-operative.

In a study of oncologic resection and chest wall reconstruction of 135 patients by Salo et al, they found that 13% of their cases required free tissue transfer.⁴ This is similar to the findings of Chang et al. who studied 113 chest wall reconstructions and found the rate of 11%.⁵ A flap of sufficient size is required as soft tissue coverage after rigid and non-rigid reconstruction has been achieved.⁶ Adequate soft tissue coverage is essential in maintaining a closed sterile barrier for the hardware beneath. The risk of any surgical site infection leads to increased morbidity and delays adjuvant therapy required. Adding to that risk is the underlying immunocompromised state of this patient which further augments the risk of surgical site infection secondary to prolonged surgery.

Although there are many workhorse myocutaneous flaps that can be utilized over the trunk, due to the previous history of radiotherapy to the left thoracic region, we have opted for an ALT flap due to several surgeon and patient factors. Initial option for either a deep inferior epigastric perforator (DIEP) flap or a transverse rectus abdominis musculocutaneous (TRAM) flap was not agreeable by the patient due to the risk of abdominal wall herniation. We then decided to the use of the ALT flap which provides a large skin paddle, long pedicle and reliable vascularity in complex oncological chest wall reconstruction.^{6,7} This flap also provides myocutaneous tissue and donor vessels that is away from the previous irradiated region despite scarring over the lateral thigh which was more acceptable to the patient.

Of greater significance, particularly in instances of recurring breast cancer with previous reconstruction, is the presence of an accessible recipient vessel, which is crucial for ensuring the success of this reconstruction. However there are not many publications found on the challenges of finding a recipient vessel in cases with prior breast reconstruction and radiation. We describe the challenges in looking for a recipient vessel in cases with prior axillary clearance and the reliability of the thoracodorsal vessels as a lifeboat vessel.

In this case, the latissimus dorsi flap was used as a pedicled flap during the initial breast reconstruction in a skin

sparing mastectomy prior. Histopathology report shows that the carcinoma has invaded the latissimus dorsi muscle flap. The reliability in using the thoracodorsal vessel as a recipient vessel is questionable as the resection margins may involve the entire pedicle. There is also the possibility of thrombosis and micrometastasis in the vessels if the vessel is used for subsequent reconstruction.⁸

Prior axillary clearance produced a fair bit of scarring in the axilla which present as a disadvantage in looking for a recipient vessel. There is also risk of radiation-induced vasculopathy in this patient who has had radiotherapy.^{9,10} Several steps can be taken as part of the planning prior to surgery which includes preoperative CT angiogram or doppler studies to identify patency of the thoracodorsal vessels. Animal studies have also shown that the use of atorvastatin prevented vascular damage in patients undergoing radiation therapy.⁹ Post-operatively, the ALT flap had good vascular supply and no flap complications was encountered. This shows the reliability of using the thoracodorsal vessels in patients with prior locoregional reconstruction with the latissimus dorsi flap.

Chest wall reconstruction is a challenging work of art which has severe ramifications if complications arise. Complications such as respiratory failure and wound infections can result in a systemic response of the body. Prosthetic complications such as infection and extrusion of the titanium plates may require removal of the prosthesis and pose another challenging chest wall reconstruction for the surgeons involved.

6. CONCLUSIONS

The use of the thoracodorsal vessels as a recipient vessel in cases with prior breast reconstruction is reliable albeit challenges intraoperatively to isolate the vessel due to its location and prior axillary clearance. It is important to preserve possible recipient vessels for reconstruction in cases which are categorized as high risk for recurrence.

Conflict of interest

None declared.

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References

- 1 Colleoni M, Sun Z, Price KN, et al. Annual Hazard Rates of Recurrence for Breast Cancer During 24 Years of Follow-Up: Results From the International Breast Cancer Study Group Trials I to V. *J Clin Oncol*. 2016;34(9):927–935. <https://doi.org/10.1200/jco.2015.62.3504>.
- 2 Thöle M, Jezierska-Thöle A, Schensar R, Gwiazdzińska-Goraj M. Trends in breast cancer incidence and mortality, clinical diagnosis and treatment in the light of the contemporary demographic changes in Germany and Poland. *Pol Ann Med*. 2020;27(2):159–167. <https://doi.org/10.29089/2020.20.00129>.
- 3 Wakeam E, Acuna SA, Keshavjee S. Chest wall resection for recurrent breast cancer in the modern era. *Ann Surg*. 2018;267(4):646–655. <https://doi.org/10.1097/sla.0000000000002310>.
- 4 Salo JTK, Tukiainen EJ. Oncologic resection and reconstruction of the chest wall. *Plast Reconstr Surg*. 2018;142(2):536–547. <https://doi.org/10.1097/prs.0000000000004597>.
- 5 Chang RR, Mehrara BJ, Hu QY, Disa JJ, Cordeiro PG. Reconstruction of complex oncologic chest wall defects. *Ann Plast Surg*. 2004;52(5):471–479. <https://doi.org/10.1097/01.sap.0000122653.09641.f8>.
- 6 Chai CS, Shamugam K, Basiron NB, et al. Challenges in complex oncological chest wall reconstruction with free anterolateral thigh flap and titanium rib plate. *Indian J Plast Surg*. 2023;56(02):166–172. <https://doi.org/10.1055%2Fs-0043-1761177>.
- 7 Song D, Li Z, Zhang Y, et al. [Application of expanded anterolateral thigh myocutaneous flap in the repair of huge chest wall defect]. *Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi*. 2022;36(7):834–839. <https://doi.org/10.7507/1002-1892.202202001>.
- 8 Bucknor A, Syed M, Gui G, James S. Thrombosis of the internal mammary artery during delayed autologous breast reconstruction: A manifestation of occult residual cancer. *JPRAS Open*. 2016;8:6–8. <https://doi.org/10.1016/j.jptra.2016.02.001>.
- 9 Yang EH, Marmagkiolis K, Balanescu DV, et al. Radiation-induced vascular disease – A state-of-the-art review. *Front Cardiovasc Med*. 2021;8: 652761. <https://doi.org/10.3389/fcvm.2021.652761>.
- 10 Yavari A, Molaei H, Ghahremani A, Etemad O, Amini H, Rafieian S. The thoracoacromial artery as the lifeboat in recipient artery deficiency in complex chest wall defect reconstruction. *Int J Surg Case Rep*. 2023;106:108057. <https://doi.org/10.1016/j.ijscr.2023.108057>.